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ABSTRACT

An instrument was developed to measure perceived levels of anxiety of students enrolled in a resident outdoor adventure education course, and to confirm four underlying factors that contribute to anxiety in such settings. These factors are level of control, program inadequacies, personal inadequacies, and level of comfort. A 53-item Outdoor Education Practicum (OEP) questionnaire that employed the certainty method of scaling was field tested with 440 students from the State University of New York College at Cortland enrolled in the physical education teaching certification program and the recreation program. The instrument was determined to be sufficiently reliable by applying Cronbach's alpha, an internal consistency technique, to the pretest data, and by employing an identical procedure with the field test data. The validity of the OEP questionnaire was established by surveying the literature, questioning students similar to those used in the study, and exposing the questionnaire to a panel of experts. Analysis of the parameter and overall estimates supported the proposed four-factor model. However, the model fit the data only moderately. High correlations between the latent variables, moderate factor loadings, and relatively high error estimates indicate that the variance in the data may be explained better by a different model. Studies that involve triangulation techniques of self-reported measures, observations by trained researchers, and physiological measures would contribute greatly to understanding anxiety in adventure education programs. (Contains 29 references.) (TD)

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VALIDITY AND RELIABILITY OF THE OUTDOOR EDUCATION PRACTICUM QUESTIONNAIRE

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ED 438 982

Introduction

Adventure based educational programs which take students into the natural environment for physical and psychological benefits continue to grow in popularity (Ewert 1986b). Values of these programs may include developing and maintaining a fitness base and honing psychomotor skills such as rock climbing techniques or canoeing. Benefits include the development of problem solving skills, better interpersonal relationships and a positive change in self image (Ewert, 1988). As these programs grow in popularity, program administrators and educators have an increased need to understand the intricacies of these experiences in a tangible form. Qualitative data, anecdotal experience, and narratives regarding outcomes are only part of the decision-making process concerning creation and modification of content in educational programs. Qualitative evaluation methods may provide valuable information needed to properly assess the substance and outcomes of adventure based experiences.

Examples of outcome based measures which assess effects in outdoor adventure programs include physical, sociological, and psychological variables (Ewert, 1986a). Braverman, Brenner, Frentz and Desmond (1990) suggested three components for measuring these variables: 1) A formal system of feedback from leaders and students, 2) experimental evaluations using qualitative self-report measures, and 3) naturalistic evaluation using case study techniques or personal interviews. Other components that can be measured include direct monitoring of physiological variables such as heart rate and blood pressure. Such techniques yield an indication of the effect of such programs, however, they do not indicate what is critical within the experience that elicits these changes. Ewert (1986b) argued that we need to take a more critical view of what we do by asking the question "how" something happens as well as "whether" something happens. He further argued that by understanding the "glue", or the nature of adventure experiences, that holds our profession together we can better understand how these experiences have an impact on individuals.

Examination of accepted definitions of adventure provide some insight into the nature of the experience and uncertainty of the outcomes appears to be fundamental to the existence of an adventure experience. Uncertainty may take the form of a perceived loss of control, personal inadequacies, program inadequacies or level of comfort. In any case, accompanying uncertainty of outcome is the possibility of loss and anxiety concerning that loss. A valid and reliable measurement of perceived anxiety would provide useful information in regard to creation and facilitation of adventure based programs for educators and administrators.

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Purpose

The purpose of this study was to design a reliable and valid instrument to measure perceived levels of anxiety of students enrolled in a resident outdoor adventure education course, and to support a four-factor model of perceived levels of anxiety of students in such programs. The four proposed factors or latent variables include: 1) Level of Control, 2) Program Inadequacies, 3) Personal Inadequacies, and 4) Level of Comfort.

Significance of the Study

The development of the outdoor education practicum questionnaire represents an attempt to create a valid and reliable instrument in a relatively unexplored area. That in itself is significant. Such an instrument may be useful in helping program administrators understand how components of a program may be designed to produce appropriate levels of anxiety. An administrator that seeks to eliminate anxiety changes the nature of the program to one of non-adventure. Fundamental to the outdoor adventure experience is uncertainty of outcome and some level of anxiety concerning that outcome. Adequate measurements will help identify the sources and magnitude of anxiety producing experiences. It will be up to the program administrator and instructors to decide which anxiety producing stimuli are central to accomplishing the objectives of the program and which are not. Based on this information certain experiences within the programs may be eliminated while others may be emphasized. Ultimately, program administrators can use this information to create a program which is more effective in accomplishing stated objectives.

Ewert (1986a) stated that people initially come to adventure education programs expecting a high degree of safety and a minimum degree of exposure to *unnecessary* risk. They also expect an appropriate alignment of activities with program objectives. Understanding anxiety components in adventure programs is certainly essential in meeting student expectations.

Indices of participant anxiety have distinct practical benefits to educators as well as researchers and administrators (Ewert, 1989). Adventure educators often work closely with students in unusual settings. These settings frequently involve inaccessible or remote places with little or no contact to base camps. Such situations often require the practitioner to make decisions without the benefit of input from administrators or other professionals. Since many of the environments in which adventure activities take place are anxiety producing, discerning sources of student anxiety would help the practitioner conduct a safe, productive learning experience.

In addition, leadership studies suggest that interpersonal skills are an important ingredient to adventure educators. Since anxiety is a deeply personal experience, it behooves the instructor to understand what situations or experiences are likely to elicit anxiety responses in their students. Ewert (1989) stated a lack of connectedness between the use of fear or stress and the hoped-for results is detrimental to the student's trust of an instructor.

Literature Review

Fear, anxiety and stress are related constructs. Hackford and Spielberger (1989) notes stress is a complex psychobiological process involving stressors, perceptions of threat, and emotional responses. Iso-Ahola (1986) discussed physiological and psychological responses to stress. Ewert defined stress as a condition which arouses anxiety and fear, identifying stress as the "trigger" of

fear. Psychological literature does not consistently make distinctions between the terms fear and anxiety. However, fear has generally been associated with alarm or disquiet emerging from a specific source of perceived threat, and anxiety is often thought of as a feeling of apprehension unrelated to a tangible source of stimulation. (Hauck, 1975). For the purpose of this paper, there will be no distinction made between fear and anxiety.

Iso-Ahola (1986) contrasted arousal and anxiety. Arousal can be thought of as a level of mental activity ranging from coma to a highly agitated state. Anxiety may be defined as excessive arousal as represented in the Figure 1.

Fundamental to the anxiety response is the *perception* of a stressor (Hackford & Spielberger, 1989). The stressor is the trigger mechanism that induces anxiety. Stressors in adventure based education programs may be perceptions of risk which can be social, such as not being accepted into the group; physical, such as fast moving water or falling; or psychological such as being fearful about not having enough training. It is important to note that the stressors may be real, perhaps such as knowing one is skiing in an avalanche area, or imagined, such as being afraid of falling off a challenge course element while connected to a complete belay chain with an experienced belayer. In short, adventure educators hope to accomplish stated educational objectives by manipulating student anxiety levels through exposing them to unique physical and social environments. Quantitative measures of perceived anxiety represent one method of gaining insight into the anxiety response.

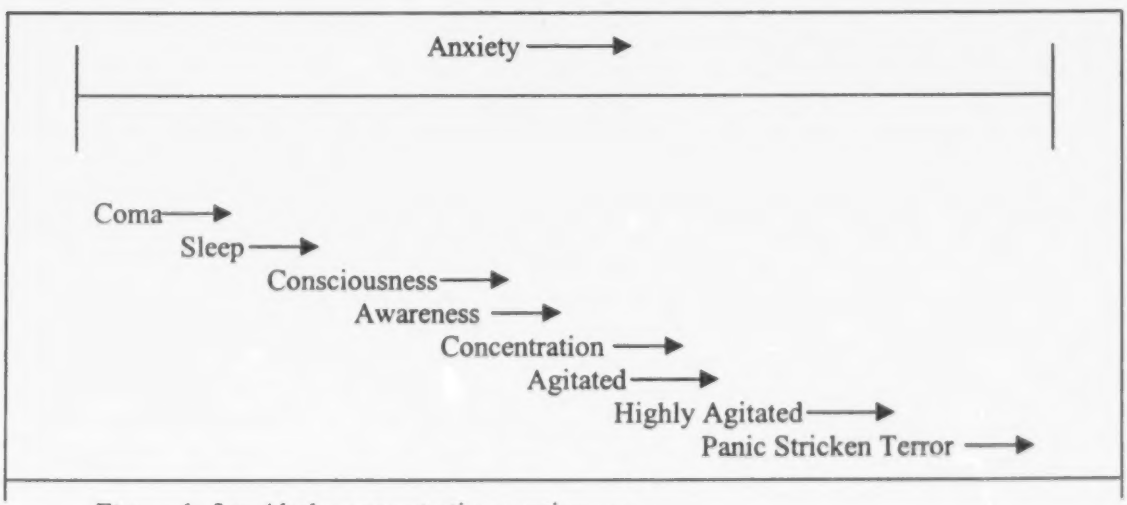


Figure 1. Iso-Ahola concentration continuum.

Classifying Anxiety in Adventure Education

There is agreement in the literature that sources of anxiety for individuals involved
in adventure education programs include factors related to environmental and sociological issues (Ewert 1985, 1986a; Priest, 1992: Ford and Blanchard, 1993). However, the literature suggests that the two factor model of environmental issues and sociological issues is too broad. Ford & Blanchard (1993) discussed physiological and environmental issues, however, both were broken down into several aspects. Environmental issues included the need for adequate rest, nutrition, maintenance of body temperatures, and others. Psychological needs include a sense of belonging, security, a need for the respect of other group members and individual differences. Ewert (1986a) created a 6 factor model of anxieties in the outdoor environment: 1) lack of control, such as being fearful about being physically trapped, 2) personal inadequacies, like making wrong decisions or letting oneself down 3) homeostasis such as temperature extremes, 4) personal skills, such as not having enough strength or not having enough training 5) level of comfort, e.g. lack of sleep or inadequate clothing and 6) program inadequacies such as instructor impatience or not enough food. Of these six factors, lack of control, homeostasis, and program inadequacies are related to the environment and personal inadequacies; personal skills and level of comfort are related to psychological concerns. Based on a review of research, and feedback from a panel of experts, a 4 factor model is proposed for this study. The factors include: 1) level of control, 2) program inadequacies, 3) personal inadequacies, 4) level of comfort.

Measurement of Attitudes

An attitude may be defined as a set of beliefs concerning a perceived stimulus. In measuring an attitude one seeks to assign numerical values to responses, using valid and reliable instruments, which represent the subject's perceptions or feelings at that time. Shaw and Wright (1967) explained that if attitudes concerning a given object, or class of objects are known it can be utilized with situational and other dispositional variables to predict and explain responses of the person to that object or class of objects. Martlett (1972) described the process of developing a Thurstone scale. The process of devising Thurstone's equal appearing interval scale involves collecting and editing opinions relating to the specific attitude. A list of items are developed, then sorted on a scale representing the item variable. Items are assigned a certain value and some are eliminated. Finally, a pool of approximately 20 items is selected and placed evenly throughout the scale.

Likert (1932) developed the summated scales system whereby a large number of items were generated which represented an attitude to be measured. The items are placed on a five point scale in a response framework ranging from strongly agree to strongly disagree, or strongly approve to strongly disapprove. The sum of item scores is calculated for statistical analysis. Likert suggested that it is necessary to generate more items than are likely to be needed because elimination of some is inevitable. The summated scales technique assumes that the scores vary as the subjects' attitudes vary. Nunally (1967) reported that Likert scales are flexible for measurement of several types of attitudes and generally yield high reliability and are easily constructed. Smith (1978) concurred with Jensen that the Thurstone method of scaling is labor intensive, particularly in obtaining

judges to evaluate item pools. For these reasons most of the instruments developed and used in assessing attitudes of participants in outdoor education and adventure education settings, including Ewert's (1986a) Situational Fears Inventory (SFI), employ Likert scaling techniques.

Likert-type scaling may employ different response frameworks. They may be limited choice frameworks ranging from 3 to 11. Figures 2 and 3 are examples of 3 and 5 point scales. Nine point and eleven point scales have been used in an attempt to increase the sensitivity of the scale. It appears that scales over seven points confuse subjects.

Semantic differential scales are sometimes used in adventure education studies. The semantic differential technique is a 7 point scale anchored by bipolar statements. The subjects are asked to place an "X" on the continuum in the place that best represents their feelings or attitudes concerning that statement. Figure 4 depicts a semantic differential scale.

Priest (1992) used a continuum method semantic differential scale identical to the scaling method employed by Ewert's (1986a) SFI to explore the factors of an adventure experience.

The type of scaling method used in this study is the Certainty method. Warren, Klonglan and Sabri (1969) introduced the Certainty Scale technique, which requires the respondent to make two decisions, one of direction and one of intensity. The scale appears to have the simplicity of a 5 point

Agree ____ Undecided ____ Disagree ____

Figure 2. 3-point Likert scale.

Strongly Agree ___ Agree ___ Undecided ___ Disagree ___ Strongly Disagree ___

Figure 3. 5-point Likert scale.

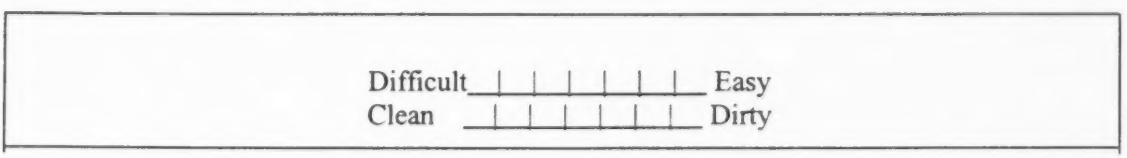


Figure 4. Semantic differential scale.

response framework, but it maintains the sensitivity of a 10 point response framework. An example of the Certainty scaling method may be found in Figure 5. Instrumentation in outdoor education and adventure education primarily involves measurement of attitudes concerning environmental issues and attitudes concerning self concept. Several studies within sport psychology literature address measurement of the anxiety response. However, there is a paucity of studies in adventure education which specifically focus on measurement techniques. Notable exceptions include work done on the Situational Fears Inventory (SFI) (Ewert 1985, 1986b; Young & Ewert 1991; Young, Quinn, & Steele, 1994). Much of the activity in instrumentation in adventure education has occurred in the self concept area. Historically, psychological instruments were employed in adventure education studies in their original form or altered to become more specific to the environment under study. Spielberger's State Trait Anxiety Inventory (STAI) is an example of such an instrument. Few instruments were developed in outdoor education or adventure education expressly for use in those specific situations. A rare example is Tholkes' (1994) study of state anxiety of ropes course participants.

Methods

The purposes of this study were to develop a valid and reliable instrument to measure situational fears in a resident outdoor adventure education setting, and to confirm four underlying factors which contribute to anxiety in such settings. The Outdoor Education Practicum Questionnaire (OEP Questionnaire) was developed by the researcher based on Ewert's Situational Fears Inventory (1985). The research methodology used in this study was for purposes of instrument development and was descriptive survey research.

Subject Selection, Population/Sample

The population of the study was students from The State University of New York (SUNY) College at Cortland enrolled in the physical education major teaching certification program and students enrolled in the recreation program. Students who registered for PED 308, and REC 370, Outdoor Education Practicum (OEP) during the summers of 1993, 1994 and 1995 were included in the study. PED 308 and REC 370 courses are identical in length and similar in content. Both courses require a six day in-camp experience which focuses on hard skill development followed by a six day wilderness trip experience. The courses are conducted at

I am anxious or fearful about

		minimally agree or disagree				strongly agree or disagree
Being unable to control social environment	Agree / Disagree	1	2	3	4	5

Figure 5. Certainty scale.

SUNY College at Cortland's Outdoor Education Center located on Raquette Lake in the Adirondack Park in Northern New York State.

Students registered in May and June 1993 sessions of PED 308 were queried concerning the structure and content of the OEP Questionnaire prior to exposure of the instrument to the Panel of Experts. Pre-test subjects were those students enrolled in August 1993 session of PED 308, *N*=54. The accessible population for the pilot test portion of this study were students registered in PED 308 and REC 370 during the summer terms of 1994 and 1995, *N*=440. Subjects ages ranged from 18 years to 52 years with an average age of 22.6 years. Sixty-three percent of the sample were male 63% (*N*=271) and 36% were female (*N*=158). The overwhelming majority of subjects were White, with only a few Hispanics and African Americans. There were no Native Americans represented in the data set.

Instrumentation

The instrument used in the pre-test was the Outdoor Education Practicum Questionnaire. The instrument, created by the researcher, is a 51 item questionnaire designed to measure perceived anxiety in an adventure education setting. The OEP Questionnaire is based on Ewert's Situational Fears Inventory (SFI) (1985). The SFI is the only known instrument prior to the OEP Questionnaire *designed* to measure perceived anxiety in the adventure education setting. The SFI has been used in several studies which have provided insight into the construct of anxiety in an adventure education setting (Ewert 1985, 1986a, 1988, 1989; Young, 1991, Young, et al., 1994).

Development of the Outdoor Education Practicum Questionnaire

Item development of the OEP Questionnaire was influenced by Ewert's (1986a) work in which he extracted six dimensions of subject perceptions of anxiety in the adventure education setting. The six dimension accounted for over 70% of the variance, with the first two dimensions accounting for over 50% of the variance, suggesting a six factor model is too narrow. A study by Young, et al., (1994) was designed to show relationships between the Certainty method of scaling and the Continuum method of scaling. In that study, the SFI was broken down into two subscales labeled Environmental Concerns and Sociological Concerns. There is agreement in the literature that sources of anxieties for individuals involved in adventure education programs include factors related to environmental and sociological issues (Ewert 1985, 1986a; Priest, 1992: Ford and Blanchard, 1993). However, the literature suggests that the two factor model of environmental issues and sociological issues is too broad. Ford & Blanchard (1993) discussed physiological and environmental issues, however, there were several aspects of each one. Environmental issues included the need for adequate rest, nutrition, maintenance of body temperatures, and others. Psychological needs include a sense of belonging, security, a need for the respect of other group members and individual differences.

This study proposed a four factor model which represents perceived levels of anxiety in the adventure education setting. These factors, or dimensions include: 1) level of control, 2) program inadequacies, 3) personal inadequacies, 4) level of comfort.

Level of Control Dimension

The level of control dimension was created based on Ewert's (1986a) study in which he found that six dimensions explained 70% of the variance in anxiety levels of participants in an adventure course. The dimension "lack of control" represented over 40% of the variance, with an Eigen value of 11.55. According to this study, issues of control appear to be contributing a great deal to levels of participant anxieties. Csikszentmihalyi (1975) discussed the importance of the participant believing they are in control of an experience in order for a "flow" experience to occur.

Program Inadequacies Dimension

Similarly, the program inadequacies dimension is supported by the Ewert (1986a) study in which program inadequacies emerged as a factor of participant anxieties in adventure programs. Ford and Blanchard (1993) discussed several needs of students in adventure based programs such as needs for shelter, nutrition and others. In adventure based education programs, students often have little to say about where the program takes place, what kind of living accommodations will be provided, and what will be included in their diet. Program administrators and educators often make these decisions for the students. Inadequacies in these areas of programming can have effects on student anxiety levels.

Personal Inadequacies Dimension

Priest (1989), supported a model of participant engagement in adventure activities that included individual and activity/setting attributes of such programs. Three of the four individual attributes and one of the three activity/setting attributes related directly to personal abilities of participants. Ewert (1986a) found that personal inadequacies was one of six factors representing participant anxieties in adventure settings. Ford and Blanchard (1993) discussed the importance of students' needs for fitting in with the group. The need to fit in with the group, or the feeling of being a part of the social structure of the group is characteristic of individuals participating in adventure education courses. Individuals bring into adventure education courses perceptions of their own physical and social abilities. If they perceive that the challenges in an adventure education course are greater than their level of competence, anxieties are likely to occur.

Level of Comfort Dimension

Priest (1992) discussed several levels of engagement in risk recreation experiences. When the level of challenge is consistent with the participant's perceived skill level a "peak adventure" experience occurs. If the experience becomes too difficult, misadventure is often the result. Misadventure is characterized by participants becoming physically uncomfortable, such as falling into cold water, or socially uncomfortable, such as being embarrassed in front of other group members. Csikszentmihalyi (1975, p. 36) discussed a "flow" experience which exists when the participant matches the task difficulty with skill levels. The resultant "flow" experience is characterized, among other things, by a feeling of comfort and enjoyment, and a lack of anxiety. Ewert (1986a) found that the level of participant comfort was one of six factors that make up perceived levels of anxiety in adventure education experiences.

From a review of the literature it was determined that four dimensions account for most of the variance of anxiety in the adventure education setting. These dimensions include: 1) level of control, 2) program inadequacies, 3) personal inadequacies, and 4) level

of comfort.

Scaling methods

The scaling method for the present study was the certainty method of scaling. Benefits of the certainty method include greater sensitivity and variability of the measure (Warren, 1969), a numerical expression of an elevated level of anxiety, and ease in codifying data. The certainty method of scaling requires the respondent to make two decisions. First, they must decide if they are concerned or not concerned about the item statement, indicated by circling "agree" or "disagree" on the response framework. Next they must decide on the intensity of their agreement or disagreement. The respondent then circles a number between 1 and 5 indicating the strength of their decision. Number 5 is the strongest response. The responses are recorded in the following response framework:

A	1 2 3 4 5
D	

Numerical values are then assigned to the responses. The range on the continuum is represented below:

ROW 1: D5 D4 D3 D2 D1 A1 A2 A3 A4 A5

ROW 2: 1 2 3 4 5 6 7 8 9 10

An even number continuum is used because it removes the possibility of a middle response between agree and disagree. Since attitudes concerning anxiety are deeply personal, forced choice was deemed necessary.

Validity and Reliability

Validity and reliability of the OEP Questionnaire were established through a six-step approach. Content validity was established through generating item variables by the following methods: 1) the researcher changed/edited items on the Situational Fears Inventory (SFI), 2) students enrolled in the Outdoor Education Practicum in May and June, 1993 were asked for feedback, 3) the OEP Questionnaire was presented to a panel of experts, 4) individual item variables were placed on one of the proposed latent variables and 5) a pre-test was employed in August 1993, (N=54). A sixth step involving a pilot test (N=433), was used to generate data useful in determining reliability and construct validity of the questionnaire.

Step 1

In this study the OEP Questionnaire is based on the 33 item form of Ewert's Situational Fears Inventory (SFI). Through a review of literature the researcher theorized the existence of four dimensions representing situational fears in resident outdoor adventure education settings. Twenty eight of Ewert's items on the SFI appeared, in part, to represent aspects of the four theorized dimensions. Minimal changes were made to these items making them consistent in form with other items on the questionnaire. Based on the researcher's professional experience in the adventure education field and within PED 308, 15 new items were created, bringing the total items to 49.

Step 2

Six groups of two or three physical education majors (N=16) enrolled in PED 308 in May and June, 1993 were asked to comment on the 49 item version of the OEP Questionnaire at various times during the experience. Students were directed to make

remarks about clarity of directions, question clearness and readability, redundancies, and addition of new items. Many comments concerned additions of new items and conditions of testing. As a result of student interviews the OEP Questionnaire length was expanded to 51 items; eight items were edited and two were added.

Step 3

Ghiselli (1981), stated that the answer to the content validity question is based on professional judgement. In order to estimate the content validity of the OEP Questionnaire a panel of experts was established. After refinements were made based on student comments, the instrument was administered to a panel of 10 experts. Three individuals experienced in instrument design were asked to comment on clarity of directions, wording of individual items and the general appearance and construction of the instrument. Three others were professional outdoor educators experienced in the Outdoor Education Practicum. They were asked to review the appropriateness of items and suggest new items which might affect the four theorized latent variables. A third group of four experts were professional outdoor educators not experienced with OEP programs. They commented on the general applicability to resident outdoor adventure education programs. Feedback from the panel of experts resulted in the rewording of 12 items, addition of 1 item, deletion of three items, and splitting of three items. The length of the OEP Questionnaire after changes totaled 52.

Step 4

Items were placed on certain latent variables for one or more of the following reasons: 1) they were a part of Ewert's (1986a) Situational Fears Inventory (SFI) and loaded on a similar latent variable found in his study, 2) variations of some items on the SFI were adapted and used on Young and Ewert's (1991) 33 item version of the SFI, 3) items were placed by the researcher based on professional judgement, and 4) items were placed due to discussions with members of the panel of experts. This completed changes made to the OEP Questionnaire prior to the pre-test.

Step 5

Administration of a pre-test to 54 physical education students took place in August, 1993 (N=54). Students were randomly assigned to four different testing areas. Once the students were situated at the tables the instrument was distributed, directions read, and an opportunity for questions was provided. Upon completion, the subjects were asked to be certain the attribute data section of the questionnaire was completed. Data analysis of pre-test data included descriptive statistics consisting of measures of central tendency, standard deviation and range. To determine if there were any redundant items in the pre-test instrument, a correlation matrix was created. Any variables correlating above .90 were judged redundant. The items BEING SEXUALLY HARASSED BY PEERS and BEING SEXUALLY HARASSED BY INSTRUCTORS correlated at .91. As a result the items were combined and a new item was created, labeled BEING SEXUALLY HARASSED. However, the two original items BEING SEXUALLY HARASSED BY PEERS and BEING SEXUALLY HARASSED BY INSTRUCTORS were retained within a subset of the field test data (N=294) because of feedback from members of the panel of experts who considered the distinction by population important.

The next highest correlation (.81) was in items UNQUALIFIED INSTRUCTORS and UNFRIENDLY INSTRUCTORS. These items appeared in sequence on the pre-test

instrument. The researcher acknowledged the similarity of these items, however, based on feedback from certain members of the panel, it was determined to leave both items on the field test instrument unchanged. They have been repositioned within the program inadequacies subscale. Inclusion of the new item "BEING SEXUALLY HARASSED" changed the length of the OEP Questionnaire to 53 items. This completed changes to the OEP questionnaire prior to the field test.

Step 6

To substantiate the reliability of the OEP Questionnaire and to gain indicators of content validity, a field test was conducted during 2 consecutive summers, 1994 and 1995 (N=433). Of these subjects, 76% were Physical Education majors and 24% were Recreation majors. 53% were collected in the summer of 1994 and 47% were collected in 1995. t-tests were conducted to determine if there were any significant differences between 1994 and 1995 subjects, and between Recreation and Physical Education majors. No significant differences were noted ($p \geq .01$), so the data was pooled for analysis.

Reliability

The reliability of the OEP Questionnaire is based on the degree to which items on the questionnaire intercorrelate with each other, or are internally consistent. To assess preliminary reliability, Cronbach's alpha, a measure of internal consistency was used on the 52 item pre-test instrument and each of the 4 subscales. The alpha values generated from the pre-test helped determine overall reliability of the scale and subscales and the stability of each item within the subscales. To further substantiate the reliability of the OEP Questionnaire, an identical process was used on the field test data.

Construct Validity

Construct validity is concerned with the degree to which the instrument actually measures what it purports to measure. Byrne (1989), stated that in social science, researchers are often interested in studying constructs that cannot be directly observed. Examples of these latent variables include anxiety, self concept and others. The technique most commonly used to discover underlying relationships between latent variables is factor analysis. There are two types of factor analysis, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Exploratory factor analysis assumes that underlying dimensions or factors can be used to explain complex phenomenon. It is an intercorrelational technique that uses correlations between observable variables to explain relationships on factors not directly observable. Exploratory factor analysis is useful for identifying underlying factors based on intercorrelations between observed variables.

Confirmatory factor analysis assumes the researcher has some knowledge of the latent variables based on theory, empirical research or a combination of both (Byrne, 1989). Based on that knowledge, the researcher creates a model intended to explain the relationships between observed (exogenous) variables and latent (endogenous) variables. The model should specify which observed variables load on specific latent variables and which of the latent variables are correlated. Stevens (1996) stated that confirmatory factor analysis techniques permit the researcher to "force" certain observed variables to load on specific latent variables. He believed this to be a limitation of the EFA model. Confirmatory factor analysis permits the researcher to specify the model in advance by determining which factors load on different latent variables and what the relationships among the latent variables are.

For the purpose of this study confirmatory factor analysis was used because there is empirical and theoretical evidence to support the existence of latent variables which constitute perceived levels of anxiety in the adventure education setting. Each individual item on the OEP Questionnaire represents a distinct observed variable. Variables included in the analysis were all variables in the complete data set K=51.

The latent variables include: 1) level of control, 2) program inadequacies, 3) personal inadequacies and 4) level of comfort.

In the proposed theoretical model, 51 observed variables load on four latent variables. Confirmatory factor analysis takes into account errors associated with each observed variable. According to Stevens (1996) the error terms contain measurement error due to the lack of reliability of the observed variables, in addition to unobserved or unique variance and are referred to as measurement errors. Arrows on the far left of the model indicate that the observed variables are effected by error as well as the factors. The arrows which point from the latent factors to the observed variables indicate factor loadings for that specific variable. Factor loadings are significant in that they give some indication of how well the model fits the data. The arrows traveling between each of the latent variables represent relationships between the latent variables and are expressed as correlations.

Overall fit estimates and parameter estimates demonstrate how well the model fits the data. Parameter estimates are concerned with individual model parameters such as factor loadings or correlations and error (Stevens, 1996) and address the substantive model fit. Overall fit estimates are concerned with how well the model, considered in totality, fits the data.

Stevens (1996) suggested that while interpreting the fit of the model, the researcher should examine the values of individual parameter estimates in addition to the overall fit. Individual parameter estimates that were considered in this study were error estimates on each item, factor loadings between each item and the appropriate predetermined latent variable, and correlations between latent variables. The overall fit indicators employed for this study were the chi-square statistic and the root mean square error of approximation (RMSEA). The chi-square statistic is perhaps the most well known measure of overall fit. It is used to test the hypothesis that the population matrix is equal to the matrix produced from the model (Stevens, 1996). It is, however, very sensitive to sample size. As the sample size increases the value of the chi-square statistic increases to the point where most any hypothesis would be rejected. Because of this, Joreskog (1993) recommended that the chi-square statistic be regarded as a goodness (or badness)-of-fit index rather that a test statistic.

The RMSEA is bounded below by zero, zero denoting a perfect fit. Furthermore, a value on the RMSEA of about .05 or less would indicate a close fit of the model in relation to the degrees of freedom, and that a value of about .08 or less for the RMSEA would indicate a reasonable error of approximation. (Browne & Cudek, 1993).

For the purposes of this study, a linear structural equation model was created to validate the OEP questionnaire. It is proposed that the 51 items, or observed variables on the OEP questionnaire will load on 4 latent variables. Confirmatory factor analysis was conducted using maximum likelihood as the population parameter estimator. The overall goodness of fit indicators used were the chi-square statistic and the RMSEA. Degrees of

freedom and numbers of parameters were used to calculate the value of the chi-square statistic. An RMSEA of .08 or less was considered acceptable when judging the overall fit of the proposed model. In addition, factor loadings, the correlation between latent variables and error estimates were considered as parameter estimates.

Findings

Objective 1

The first objective of the study was to develop a reliable instrument designed to measure perceived anxiety in the outdoor adventure education setting.

Preliminary reliability estimates were calculated using Cronbach's alpha, an internal consistency technique applied to the pre-test data. Reliability coefficients were calculated for the 52 item instrument and again on each of the subscales to gain an indicator of reliability for the entire instrument and for each of the subscales. Results are found in Table 1. Nunally (1967), asserts that .50 is the minimum level of acceptance when assessing reliability of new instruments. The values gained from the analysis revealed coefficients well above Nunally's .50 criteria. Further evaluation of reliability was gained by employing a procedure with the field test data identical to that used with the pre-test data. Cronbach's alpha was utilized on the entire scale and each of the subscales. Values may be found in Table 2. Based on this analysis the overall scale and each of the subscales were determined to be sufficiently reliable for students registered for OEP courses.

Table 1

Internal consistency, pre-test data, Cronbach alpha values, entire scale, subscales

Entire Scale	Control	Program Inadequacy	Personal Inadequacy	Comfort
.9330	.8160	.8933	.8682	.8661
K^a= 52	K= 15	K= 10	K= 11	K= 16

Note. N = 54

[a]K = Number of item variables

Table 2

Internal consistency, field test data, scale, subscales, reliability coefficients Cronbach alpha values

	Entire scale	Control	Program inadequacy	Personal inadequacy	Comfort
Data set	.9520	.8481	.8811	.8957	.8925
	K^a = 51	K = 14	K = 10	K = 11	K = 16

Note. N = 433

[a]K = Number of item variables

Objective 2

Objective 2 was to develop a valid instrument designed to measure perceived anxiety in the outdoor adventure education setting.

The validity of the OEP Questionnaire was established through a several step process. A theoretical model of perceived levels of anxiety in adventure education programs was constructed by surveying the literature, questioning students similar to those used in the study, and exposing the OEP Questionnaire to a panel of experts. A statistical model was created by conducting a field test (N=433) and conducting confirmatory factor analysis with the data.

Theoretical Model

The theoretical model was gleaned by examining current research in the area of fear and anxiety in adventure programs. The OEP Questionnaire is based on Ewert's (1985) Situational Fears Inventory, and the theoretical model used in this study is based largely on studies that have used the SFI. The four theorized latent variables include: 1) level of control, 2) program inadequacies, 3) personal inadequacies and 4) level of comfort.

Objective 3

The third objective was to develop a theoretical model to empirically evaluate perceived anxiety in the outdoor adventure education setting.

Statistical Model

For the purpose of this study confirmatory factor analysis was used because there is empirical and theoretical evidence to support the existence of latent variables which constitute perceived levels of anxiety in the adventure education setting. The four theorized latent variables include: 1) level of control, 2) program inadequacies, 3) personal inadequacies and 4) level of comfort.

Confirmatory factor analysis was used for analysis of the field test data (N=433). The 51 item version was tested using RAMONA, a confirmatory factor analysis computer program. The statistical model is presented in Figure 4.

The following assumptions were made on the statistical model: 1) there are four latent variables, 2) the four latent variables are correlated, 3) there are 51 observed variables, 4) the 51 observed variables load onto the latent variables, 5) each observed variable loads onto only one latent variable, 6) measurement error is taken into account for each observed variable, and 7) the measurement errors are uncorrelated. The analysis for the statistical model was done in five steps. 1) The population parameters were estimated from the sample using maximum likelihood techniques, 2) correlation coefficients were generated to determine relationships between each of the latent variables, 3) factor loadings between the 51 observed variables and the four latent variables were calculated, 4) error estimates were obtained on each of the observed variables, and 5) estimators of overall fit of the model were determined.

Parameter estimates

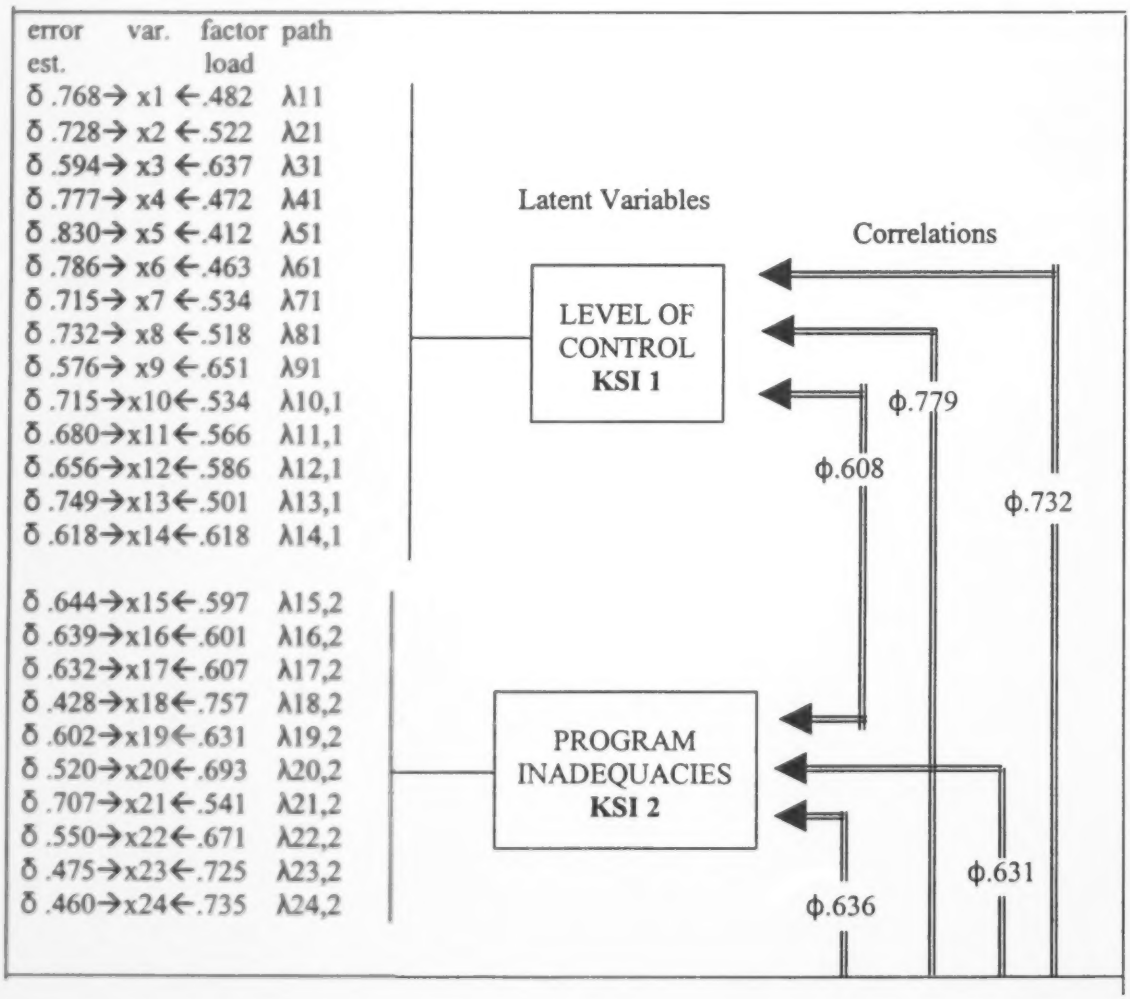
Data analysis was conducted using the RAMONA statistical package. Maximum likelihood techniques were used to generate population parameter estimates based on the sample correlation matrix. Error residuals were calculated, indicating the relationship between the estimated population and the sample. The values of the residual matrix indicate a good fit between the estimated population values and the sample values.

The model specified that correlations exist between the four endogenous variables. These correlations are listed in Table 3, and are specified in Figure 4 by ϕ.

Table 3

Latent variable correlations, statistical model, field test data

Path	Point est.	Standard error	*t*-value
Control ↔ program inadequacies	0.608	0.038	16.19
Control ↔ personal inadequacies	0.779	0.026	30.19
Control ↔ level of comfort	0.732	0.029	24.90
Program inadequacies ↔ personal inadequacies	0.636	0.034	18.63
Program inadequacies ↔ level of comfort	0.631	0.035	18.18
Personal inadequacies ↔ level of comfort	0.706	0.029	24.04



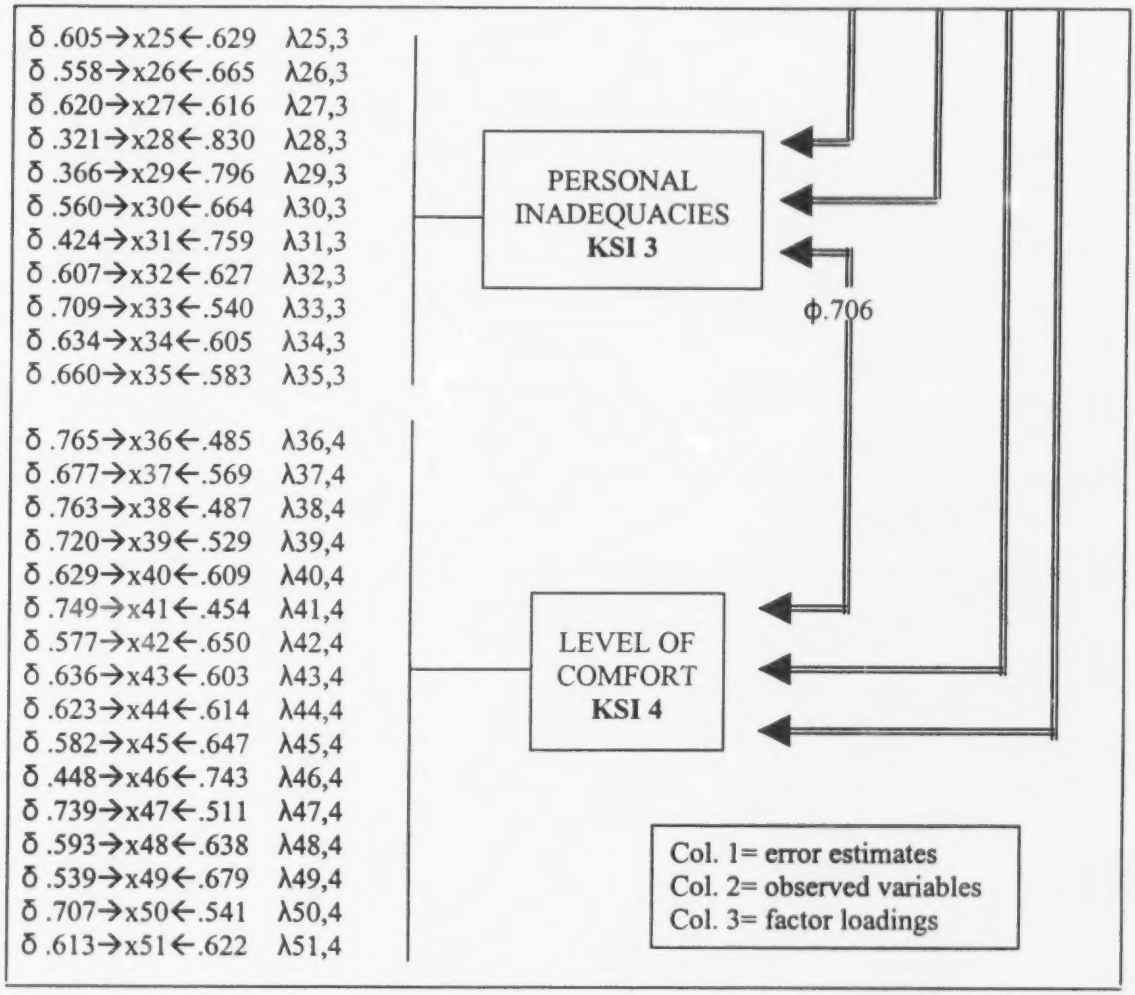


Figure 4. Statistical model.

Latent variable correlations

All latent variables were positively correlated with one another indicating shared variance. The correlations ranged from .608 to .779. The strongest correlation was between Level of Control and Personal Inadequacies (.779) demonstrating a clear relationship between the two latent variables. Level of Control and Level of Comfort correlated strongly at .732. The weakest correlation occurred between Level of Control and Program Inadequacies (.608), indicating it is the most distinct latent variable of the four, however it is still considered to be high. Strong correlations existed between Program Inadequacies and Personal Inadequacies (.636), and between Personal Inadequacies and Level of Comfort (.631). Similarly, a strong correlation exists between the Personal Inadequacies dimension and the Level of Comfort dimension. The data suggests that participant perceptions of anxiety in adventure education programs are related to one another. However, it is consistent with past research (Ewert 1986a, 1989; Young & Ewert, 1991; Ford & Blanchard, 1993) which suggests a distinction between environmental and sociological anxieties.

The standard error values range from .026 to .038, indicating little error in the correlation values. All of the *t*-values are >2.0, ranging from 16.19 to 30.19. Stevens (1996) stated that *t*-values over 2.0 are commonly taken to be significant and they have been judged so here.

Factor loadings

Confirmatory factor analysis techniques requires the researcher to predetermine which exogenous (observed) variables (*N*=51) will load on certain endogenous (latent) variables (*N*=4). Factor loadings indicate the degree to which the latent variables, or factors affect the observed variables, or items. These values are indicated by the alpha symbol (l) and are found on the statistical model, Figure 4. Standard error values are low indicating a minimum of error in the factor loading values.

All observed variables were "forced" to load on specific latent variables. The values indicate how well each of them do so. A factor loading of >.4 is considered to be significant for the purposes of this study. Factor loadings for variables X_1 through X_{14}, which loaded on the Level of Control latent variable range from .412 to .651 indicating moderate fits of these items on that dimension. Those variables loading on the Program Inadequacies dimension showed stronger relationships, loading between .541 and .757. Most of the item variables on the Program Inadequacies dimension were related to environmental issues. Stronger factor loadings on this latent variable are consistent with past research suggesting students are anxious about environmental issues in adventure based programs.

Variables designed to load on the Personal Inadequacies dimension vary between .540 and .830 indicating strong relationships between observed and latent variables. Values of factor loading on the Level of Comfort dimension ranged from .454 to .650 indicating a moderate fit. Overall, the factor loadings ranged from .412 to .830 indicating the observed variables had significant loadings on the factors they were designed to measure.

Error estimates

Error values have been calculated and are represented by the delta (d) symbol in Figure 4. The error values indicate the measurement error associated with the observed variables. Large values indicate a greater amount of error. The range of error values associated with the latent variables are: 1)

Level of Control, from .594 to .830, 2) Program Inadequacies, from .428 to .707, 3) Personal Inadequacies from .321 to .709, and 4) Level of Comfort, from .765 to .448. The overall scale ranged from .321 to .830. Thirty-six values were above 0.60 indicating likelihood that many of the observed variables would also load on other latent variables suggesting a different latent variable structure on the OEP Questionnaire.

Overall model fit

The overall fit estimators are used to describe how well the total model, including all parameters, fits the data. This model involved 108 parameters: 51 error estimates, 51 factor loadings and 6 correlations between latent variables. The model had 1,218 degrees of freedom.

The overall fit estimators used in the study were the Chi Square statistic (X^2)and the Root Mean Square Error of Approximation (RMSEA)

The X^2 statistic of 4478 with an N of 433 and 108 parameters was significant at p= <.05 indicating that the model does not adequately account for the covariance among the variables, however, the X^2 statistic is effected by sample size, and should not be interpreted as the only indicator of model fit. It is most useful when comparing different models. The RMSEA value was .079 indicating a moderate fit of the model. Browne & Cudek (1989) indicated that a perfect fit of the model would result in a 0.0 RMSEA, however, a value of 0.05 indicates a near fit, and values <.08 indicate an adequate fit.

Conclusions and Recommendations

Objective 1 of the study was to develop a reliable instrument designed to measure perceived levels of anxiety in resident adventure education programs. Initial estimates of reliability of the OEP Questionnaire were established by calculating Cronbach's alpha values on each of the four subscales, or latent variables on a pre-test (N=54). Each of the subscales had alpha values greater than 0.80 indicating good internal consistency.

An identical procedure was used on the field test data (N=433). Cronbach's alpha values for each of the subscales were >0.84, indicating acceptable levels of internal consistency. Based on the analysis, the subscales on the OEP questionnaire were judged as sufficiently reliable within the OEP setting.

Objective 2 was to validate the OEP Questionnaire. This was accomplished by a several step process which focused on development of a theoretical model, and issues of content validity. Ewert's (1985) Situational Fears Inventory (SFI) served as the basis for the development of the OEP Questionnaire. Based on the 33 item form of the SFI and a survey of the literature, the researcher generated new items designed to load on the four theorized latent variables. Students enrolled in an OEP course in 1993 were then asked to give feedback concerning completeness and clarity of directions. Asking subjects similar to the test subjects to comment on the development of the instrument is an uncommon step in instrument development. However, in this study it was consider to be valuable. Comments by students concerning the OEP Questionnaire were helpful in creating and tailoring items, and in making the OEP Questionnaire appropriate for use with the target population.

A panel of experts was developed consisting of measurement experts, experienced outdoor leaders and OEP practicum staff (N=10). The panel was unusually large, and uniquely qualified to make comments on the OEP Questionnaire. It consisted of individuals who served in leadership positions within major adventure education organiza-

tions within the United States, such as Outward Bound, The Wilderness Education Association and Project Adventure. The panel included Alan Ewert, creator of the SFI, on which this work was based.

Based on this process, the theoretical model is considered to be representative of student anxieties in resident outdoor adventure education programs.

Objective 3 was to determine the factors associated with perceived fear levels in adventure education programs. This was accomplished by testing the theoretical model using confirmatory factor analysis on field test data. Objective 3 relates to construct validity of the OEP Questionnaire.

The field test occurred at OEP courses during the summers of 1994 and 1995 (N=433). Maximum likelihood techniques were used to generate population parameter estimates based on the field test sample correlation matrix. Error residuals were gained by comparing the difference between the estimated (population) correlation matrix and the observed (sample) correlation matrix. The residuals indicate the statistical relationship between the estimated population and the sample. The closer the values are to zero, the stronger the relationship between the estimated population parameter and the sample. The values of the residual matrix indicate a good statistical fit between the estimated population and the sample indicating a strong relationship between the sample and the estimated population parameter.

Strong positive correlations exist between all four latent variables. Error residuals are low, and t-values are well above 2.0. The correlation values are assumed to be representative of the relationships between the latent variables. Latent variable correlations, t-values and error residual values may be found on Table 3.

The Level of Control dimension shows the highest correlation values with other latent variables with the Personal Inadequacies dimension correlating the highest. It is reasonable to speculate that subjects will assert control over their own personal abilities. Similarly, they may try to assume control for their own level of comfort. Priest (1992) indicated that individuals seek to engage in adventure recreation experiences that are consistent with their perceived level of competence. This implies that participants will attempt to assume a degree of control over the engagement level within the experience. This is congruous with Ewert's (1989) opinion that humans seek a balance between personal abilities and individual challenges, and could explain why the level of control dimension in this study is highly correlated with other latent variables.

The items that show weak performance based on factor loadings in the 0.4 range and relatively large error indicators on the Control dimension include: BEING UNABLE TO CONTROL SOCIAL ENVIRONMENT, and BEING WITH PEOPLE I DON'T LIKE. Students may feel that this is a program inadequacy because program directors are largely responsible for the make-up of the group due to registration procedures or other practical concerns. The item BEING SEXUALLY HARASSED had a relatively weak loading. This item may load on the Level of Comfort dimension if it was free to do so.

The Level of Control dimension, relative to the remaining three dimensions showed the lowest factor loadings of individual items, and the highest correlations with other latent variables. The data support that there are elements of the control dimension in each of the other dimensions, however, to a lesser degree with Program Inadequacies. This is consistent with Csikszentmihalyi's (1975) work in which he discussed level of

control as a pervasive phenomenon in participant anxiety levels.

The Program Inadequacies dimension showed the lowest correlations with other latent variables indicating that it is the most distinct latent variable. This is not surprising in light of Ford and Blanchard's (1993) discussion of the distinction between physiological and psychological needs of students involved in adventure education programs. Furthermore, the distinction between environmental fears and social fears are well documented in anxiety research within adventure education (Ewert, 1985, 1986a, 1987, 1988; Ewert & Young, 1991; Priest, 1992; Young, et al., 1994). Most items within the program inadequacies dimension relate to environmental issues. Items found in the other three latent variables typically represent sociological issues.

There is a strong statistical relationship between the Personal Inadequacies dimension and the Level of Control dimension indicating shared variance. Again, this could be because students will try to assert some measure of control over their own personal inadequacies.

Items within the Personal Inadequacies dimension that showed strong performance were NOT PERFORMING UP TO GROUP EXPECTATIONS, NOT PERFORMING UP TO INSTRUCTOR EXPECTATIONS and LETTING OTHERS DOWN (respective factor loadings: .830, .796, and .759). All other items in this dimension loaded between .540 and .665. It is possible that the three items that loaded highly represent another distinct latent variable associated with disappointing group members.

The overall fit estimators used in the study were the Chi Square statistic (X^2) and the Root Mean Square Error of Approximation. The chi-square statistic of 4474.68 with 108 parameters and 1218 degrees of freedom indicate that the model does not fit the data. However, the X^2 statistic is extremely sensitive to sample size. The larger the sample, the higher the X^2 statistic will become. Stevens (1996) stated that the chi-square statistic is very sensitive to sample size, so that with a large enough sample, almost any hypothesis would be rejected. Joreskog, (1989) believed that the chi-square statistic is most useful when comparing several models, which is not the case here. Given the relationships among latent variables it is not surprising the X^2 statistic does not support the theoretical model. More confidence should be placed in alternative fit indexes.

The Root Mean Square error of Association (RMSEA) is a fit statistic that is less sensitive to sample size and is more appropriate for use in this study. The RMSEA value was .079 indicating a moderate fit of the model.

Analysis of the parameter estimates and the overall estimates support the proposed four factor model. However, the model fits the data only moderately. High correlations between the latent variables, moderate factor loadings and relatively high error estimates indicate that the variance in the data could perhaps be better explained by a different model.

Further Study

Instrument Development

Alternate models should be developed using exploratory factor analysis, then tested using confirmatory factor analysis techniques. Stevens (1996) stated that when assessing model fit, the researcher should hypothesize *at least* one model *apriori*. Theoretical knowledge in any one area may be ambiguous and more than one model may be tenable. Alternate models may be theorized and tested using

confirmatory factor analysis. Data in this study suggest there may be more than one viable alternate model. Several test criteria exist which permit testing of two or more models. Such models may load different observed variables onto the latent variable, or theorize different relationships between and among variables. This study suggests that exploration of the degree of control students will exert over an outdoor adventure experience is a viable avenue for future research.

Survey instruments such as the OEP Questionnaire, which are designed to measure attitudes can give preliminary insight into the phenomenon being measured. Additional valid and reliable instruments which measure other relevant attitudes which occur in adventure education settings are needed. Furthermore, self-report measures should be used with other types of measures when assessing levels of anxiety. Triangulation of measurement techniques is necessary to gain further insight into the construct of anxiety in adventure education settings. Development of measurement techniques other than self report instruments is recommended. Bunting (1993) has done research on anxiety in adventure settings using physiological measures of blood pressure and catecholamine production. She believed there are serious challenges in measuring physiological responses to adventure activities as the settings do not lend themselves well to collecting physiological data. Nevertheless, creative researchers need to take up the challenge of devising instrumentation for these settings. In addition, observational instrumentation can be developed and would be useful in conjunction with the OEP Questionnaire and certain physiological indicators. Observable characteristics of the anxiety response would need to be documented. Observers would need to be trained and interrater reliability would need to be ascertained. Studies which involve triangulation techniques of self reported measures, observations by trained researchers, and physiological measures would contribute greatly to understanding anxiety in adventure education programs.

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